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Impact of Forensic Accounting on Internal Control Effectiveness and Fraud Prevention in Nigerian Public Sector

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Abstract

Widespread fraud in Nigeria's public sector continues to undermine public policy and distort resource allocation, despite the implementation of internal control systems. Although forensic accounting is recognized as a vital tool for combating fraud, its impact on internal controls remains underexplored. This study examines the impact of forensic accounting on internal control systems, with a particular focus on fraud prevention in the Nigerian public sector. The study used a descriptive cross-sectional survey with structured 5-point Likert questionnaires to collect quantitative data from finance, accounting, control, and management staff across 43 ministries, 42 agencies, and state anti-fraud institutions. Using purposive and random sampling, 385 responses were analyzed. Reliability was tested with Cronbach's Alpha, and Partial Least Squares Structural Equation Modeling (PLS-SEM) assessed forensic accounting's role in strengthening internal controls for fraud prevention. Findings show internal control positively relates to fraud prevention ($\beta = 0.156$), and forensic accounting strongly predicts fraud prevention ($\beta = 0.407$). Importantly, forensic accounting mediates the relationship between internal controls and fraud prevention ($\beta = 0.072$), although no significant moderating effect was observed ($\beta = -0.04$). These results demonstrate that forensic accounting enhances the effectiveness of internal controls by translating control structures into practical fraud prevention outcomes. The study supports the extension of the Vutumu Forensic Accounting Theory (VFAT) model by highlighting forensic accounting as a key complement to internal controls, while emphasizing the importance of further research, policy initiatives, and targeted training to strengthen forensic accounting practices across organizations.

Keywords

Internal Control System, Forensic Accounting, Fraud Prevention, Vutumu Forensic Accounting Theory (VFAT), Committee of Sponsoring Organizations of the Treadway Commission (COSO), Nigerian Public Sector

1. Introduction

The Nigerian public sector, like many others globally, faces persistent challenges in safeguarding financial integrity and combating fraudulent activities. Fraud and corruption have long been endemic, posing significant threats to Nigeria's economic development and eroding public trust in government institutions (Eze & Okoye, 2019; Alhassan, 2021). Reports and investigations, such as those by the Anti-Corruption Agencies of Nigeria (ACAN), revealed the widespread nature of these issues (Shehu, 2022). This is reflected in Nigeria's poor ranking on the Corruption Perception Index (CPI), ranking 140 out of 180 countries in 2024 (Transparency International, 2023), alongside yearly revelations of substantial public funds lost to fraud and mismanagement.

Fraudulent practices have become systemic within the Nigerian public sector, significantly hindering public policy implementation and resource allocation (Abdulrahman, 2019). Tsegba, Duenya, & Ipevnor (2018) emphasized that the fight against fraud has persisted across colonial, military, and civilian administrations. In response to fraud, the Nigerian government has established institutions such as the Economic and Financial Crimes Commission (EFCC), the Independent Corrupt Practices Commission (ICPC), and the Code of Conduct Bureau (CCB) (Mike, Okpe, & Abu 2022). These agencies are tasked with investigating, detaining, and prosecuting offenders. However, their efforts, combined with existing internal control systems, have proven insufficient, exacerbated by inadequate internal audits, non-compliance with regulations, and instances of collusion (Ogunode & Dada, 2022). Internal control systems are expected to be crucial mechanisms for preventing and detecting fraud within organizations, including the public sector (Agbenyo, Jiang, & Cobblah, 2018; Murti & Kurniawan, 2019). Surprisingly, studies have attributed numerous organizational failures in Nigeria to ineffective internal control systems (Agbo & Obodoekwem 2020; Agang & Njokam 2020). Dada & Jimoh (2020) further alluded that inadequate resources, limited expertise, and compromised independence of internal audit departments have undermined internal control effectiveness. Cases such as Glencore's bribery allegations involving Nigerian officials between 2007 and 2018 (Lynch, 2022) underscored the persistent challenges and the need for more effective measures.

Additionally, non-compliance with existing regulations and collusion between officials and external parties often circumvent these controls (Ogwiji & Lasisi, 2022). These vulnerabilities call for urgent need for innovative approaches and enhanced measures to detect and prevent fraud effectively.

Forensic accounting offers this promising approach to addressing fraud in the Nigerian public sector. With its emphasis on investigative and preventive methodologies, forensic accounting supplements traditional internal controls. However, its application in Nigeria remains limited due to a lack of awareness, budgetary constraints, and a shortage of qualified forensic accountants (Okoye & Mbanugo, 2020; Gbegi, Gberindyer, & Duenya, 2020). These limitations hinder the development of robust fraud prevention tools, leaving the public sector vulnerable to financial misconduct and the erosion of public trust (Oyedokun, Akinwumi, & Asaolu, 2018). Association of Certified Fraud Examiners (ACFE, 2022) emphasized that strengthened internal controls, enhanced forensic accounting capabilities, public education, increased transparency, and a reinforced legal framework are essential. Oladipo & Olurotimi (2021) argued that leveraging forensic accountants can significantly reduce fraud, embezzlement, and corruption in both public and private sectors. However, meaningful progress requires political will and strategic implementation.

The research problem revolves around the vulnerability created by these weak internal control systems and the limited efficacy of forensic accounting in Nigeria's public sector. While forensic accounting is widely recognized as a powerful tool for fraud prevention, its specific role in enhancing the effectiveness of internal controls in the Nigerian public sector remains underexplored. Understanding the mechanisms through which forensic accounting influences the relationship between internal controls and fraud prevention can provide valuable insights for policymakers and practitioners. However, existing literature lacks a comprehensive analysis of these dynamics, leaving a critical gap in understanding the interplay between internal controls, forensic accounting, and fraud prevention. Through the application of the *Vutumu Forensic Accounting Theory* (Vutumu, 2024), this study specifically aims to examine whether forensic accounting acts as a moderator or mediator in linking robust internal controls with effective fraud prevention. This is because the complexities of financial misconduct demand a holistic approach that goes beyond standard control measures. As Nigeria strives for greater transparency, accountability, and resource efficiency, understanding these dynamics is critical for more effective anti-fraud measures.

2. Literature Review

2.1. Theoretical Framework

2.1.1. Agency Theory

Agency Theory: Agency theory, pioneered by Jensen and Meckling in their 1976 paper "Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure" (Ningsih & Reskino, 2023; Bendickson et al., 2016), holds significant relevance in the investigation of the moderating and mediating effect of forensic accounting on internal control and public sector fraud prevention in Nigeria. This theory provides a comprehensive framework for understanding the complex principal-agent relationships within public sector organizations. It highlights the po-

tential conflicts of interest and information asymmetry that exist in this relationship, as agents may prioritize personal gains over the principals' objectives. Such conflicts undermine the effectiveness of internal controls mechanisms designed to prevent fraud.

The agency theory's importance in this research, therefore, lies in its ability to identify and address agency problems within the Nigerian public sector, thereby reducing fraudulent activities in the Nigerian public sector.

2.1.2. The Fraud Pentagon Model

The Fraud Pentagon Model, evolving from earlier fraud theories, emphasizes five elements—pressure, opportunity, rationalization, capability, and personal ethics (Sorunke, 2016). The study utilizes this model to explore factors contributing to fraud and assess how internal control mechanisms influence these elements. Earlier theories of fraud include Donald Cressey's fraud triangle theory (1953), which posits that fraud occurs when three elements converge: opportunity, pressure, and rationalization (Abdulrahman, 2019). Pressure arises from internal or external needs that cannot be openly shared, while opportunity often stems from weak internal control systems or inadequate management oversight. Rationalization involves justifying fraudulent behavior to silence one's conscience. Wolfe & Hermanson (2004), expanded on this with the fraud diamond theory, adding "capability" as a fourth element (Wolfe & Hermanson, 2004), arguing that individuals must possess the skills and ability to exploit weaknesses in internal control systems to execute fraud effectively. Opportunity provides the chance, while capability enables the act. Sorunke (2016) proposed integrating personal ethics into these models, emphasizing that moral principles like integrity, fairness, and prudence play a significant role in fraud motivation, ideal for the Nigeria society that still places high values on personal ethics.

2.1.3. Internal Control (COSO) Framework

The Committee of Sponsoring Organizations of the Treadway Commission (COSO) Internal Control Framework is a widely recognized model. It identifies components crucial for designing control systems, providing a basis for evaluating their effectiveness in fraud prevention. The framework comprises control environment, risk assessment, control activities, information and communication, and monitoring activities (Ogwiji & Lasisi, 2022) that collectively strengthen fraud prevention. For instance, the Control Environment establishes an ethical culture and commitment to integrity; Risk Assessment identifies and evaluates vulnerabilities, enabling proactive action; Control Activities implement policies like segregation of duties to detect and deter fraud; Information and Communication ensure transparency, fostering awareness of anti-fraud measures; and Monitoring Activities involve ongoing evaluation to adapt to emerging risks. This framework will provide a comprehensive model for evaluating the effectiveness of internal control mechanisms in fraud prevention in the Nigerian public sector and in testing the interplay of forensic accounting in the relationship.

2.1.4. Vutumu Forensic Accounting Theory

Vutumu Forensic Accounting Theory (VFAT) proposed by Vutumu (2024) goes beyond mere investigative measures by introducing pivotal variables essential for effective forensic accounting in fraud prevention endeavors (Vutumu, 2024). The Theory posits that understanding the impact of certain variables and their interplay on forensic accounting practices contributes to the development of robust fraud prevention strategies, enhances organizational accountability, and strengthens the overall integrity of financial and internal control systems. The VFAT underscores the critical roles played by each of its variables, for instance, control system reliance evaluates the efficacy of how internal controls mitigate fraud risks; litigation support involves providing expert financial analysis and testimony in legal cases to resolve fraud-related disputes. Whistleblower hotlines offer a secure channel for reporting suspected fraud, enabling early detection and investigation. Sustainable governance systems promote ethical practices and transparency, fostering accountability. Additionally, ethical philosophies underpin professional behavior, ensuring high standards that enhance the credibility of fraud prevention efforts. Digital fraud review frequencies address the dynamic nature of fraud by regularly evaluating digital transactions and evolution in cybercrime. Accounting records to reporting quality is vital for maintaining accurate financial data. Finally, the frequency of system reviews variable highlights an organization's commitment to continuously identifying weaknesses and enhancing fraud prevention measures, i.e. staying ahead of the game.

Unlike the behavioral focus of fraud models such as the Fraud Pentagon, the Vutumu Forensic Accounting Theory (VFAT) introduces action-oriented and digital elements, such as control system reliance, whistleblower mechanisms, and digital fraud review frequencies, each designed to strengthen how organizations detect, respond to, and prevent fraud. In addition to ethical and governance factors that COSO does not explicitly address, VFAT extends COSO's structural guidance by shifting from generic internal control components to forensic-enhanced control evaluation, where variables assess not only the presence of controls but also their trustworthiness, resilience, and forensic sensitivity. VFAT's digital fraud review further addresses cyber-enabled risks overlooked by COSO and traditional fraud theories, thereby extending COSO's principles into a forensic-focused context. By integrating forensic investigation, technology, ethics, and continuous system evaluation, VFAT offers a comprehensive framework suited to today's increasingly complex, digital, and system-driven fraud landscape, thereby strengthening its relevance and applicability to contemporary fraud prevention efforts.

In conclusion, this study integrates agency theory to analyze principal-agent relationships, the Fraud Pentagon model to identify risks in that relationship, COSO to address them, and Vutumu Forensic Accounting Theory (VFAT) to investigate and strengthen the internal controls. In other words, it aims to evaluate the effectiveness of forensic accounting's role in mitigating agency problems by

impacting existing internal control systems in fraud prevention in Nigeria's public sector.

2.2. Empirical Review

2.2.1. Fraud Prevention

Sorunke (2016) conducted exploratory research to examine the role of personal ethics in a fraudster's motivation. Data was collected from experienced auditors and fraud investigators from Nigerian law enforcement agencies using a Likert-scale questionnaire. The study found that individuals with strong personal ethics were less likely to commit fraud, concluding that personal ethics is a crucial motivating factor alongside pressure, opportunity, rationalization, and capability. This aligns with Said et al. (2017) who integrated ethical values into the fraud triangle theory in the context of Malaysian banking industry, and with Sujeewa et al. (2018) who performed an empirical study aimed at enhancing the understanding of employee fraud and its causative factors among external auditors, forensic accountants, and other stakeholders in Malaysia.

Despite Sorunke (2016)'s emphasis on personal ethics, limited literature in Nigeria considers it the fifth element in fraudster motivation. Abdullahi & Mansor (2018) examined the relationship that exist between the elements of Fraud Triangle Theory and fraud incidences in the Nigerian public sector using a quantitative survey approach and found that the three components have a positive relationship with fraud occurrences. Similarly, Omijeh (2023) achored on the Fraud Triangle Theory to explore the different strategies for dealing with digital frauds in the Nigeria and found that the growth of digital economy is hampered by the escalating attempts of fraudsters.

Furthermore, Dwimawanti & Ramadani (2023) empirically assessed the fraud potential of the public service in Indonesia by analysing the components of the Fraud Diamond Theory and found that public service fraud in Indonesia is influenced by Fraud Diamond Theory components. Another study carried out by Jikiri et al. (2022) anchoring on Fraud Triangle, examined field evidence of fraud in one of the leading microfinance institutions, ASA Philippines Foundation, and it was also revealed that weak internal control creates opportunities for perpetrators of fraud. Other studies such as Enofe, Egbe, & America (2016), found a significant impact of employees' capability and management integrity on both the perpetration and prevention of fraud in the Nigerian public sector, Singal et al. (2019) found that there is a positively significant relationship between the use of management fraud prevention policies and the occurrence of frauds in public sector organisations. Conclusively, the empirical evidence above highlight the importance of pressure, opportunity, rationalization, capability, and personal ethics as key fraud motivators in the Nigerian public sector.

2.2.2. Internal Control

In their 2023 survey research, Awotomilusi et al. (2023) examined the impact of internal control systems on fraud prevention and detection in Ekiti State's public

institutions in Nigeria, with a focus on the COSO control framework. The study found that internal control, in the overall, significantly impacts fraud prevention and detection. Several other studies have investigated the impact of internal control systems on fraud prevention in various settings. Agwor & Akani (2017), in a cross-sectional survey focusing on the public service of Bayelsa State, Nigeria, established a robust relationship between internal control and fraud prevention. Similarly, Iyinomen (2020) examined internal control's influence on fraud prevention and detection in Anambra State, Nigeria, revealing that inadequate experience among internal control staff poses a risk of fraud. Ibrahim (2017) conducted an empirical analysis at the Federal Inland Revenue Service (FIRS) in Nigeria, using qualitative and quantitative approaches, involving questionnaires administered to 38 senior staff, and found that the COSO components significantly impact the quality of internal control systems.

In Kakamega County, Kenya, Oguda, Odhiambo, & Byaruhanga (2015) investigated the effect of internal controls on fraud prevention and detection in district treasuries, revealing a statistically significant and positive relationship between the adequacy of internal control systems (COSO) and fraud prevention and detection. Similar results from Riitho & Wanjala (2020), who analyzed the relationship between the implementation of internal control (COSO) and fraud mitigation among savings and credit cooperatives societies (Saccos) in Kenya and Ghasemi et al. (2022) who examined the role of internal control and accountability in NGOs in the Fako Sub-division of Cameroon. These studies collectively suggest a significantly positive relationship between internal control and fraud prevention and detection across diverse organizational contexts. We have not found any conflicting findings in the existing literature regarding the overall significance of internal control in fraud prevention.

2.2.3. Forensic Accounting

Abdulrahman (2019) examined the effect of forensic accounting on fraud prevention in Nigerian public sector by using the exploratory research design methodology and found that there exists a significant positive influence between forensic accounting techniques and fraud prevention. Multiple studies have affirmed the significant role of forensic accounting in fraud detection and prevention within the public sector. Eze & Okoye (2019) Multiple studies have affirmed the significant role of forensic accounting in fraud detection and prevention within the public sector. While Gbegi et al. (2020) highlighted the necessity of forensic auditors in local government councils. Ogunode & Dada (2022) established a strong positive relationship between forensic accounting and fraud prevention at both corporate and national levels. Similarly, Alhassan (2021) linked forensic accounting to legal actions in Nigerian courts, Oladipo & Olurotimi (2021) confirmed its influence on fraud prevention in MDAs over a decade-long study. Other research, including Efut & Okoye (2019) and Fiergbor (2020), further reinforced forensic accounting's role in combating fraud. However, despite its recognized benefits, there is limited understanding of its specific impact on the relationship between

internal control and fraud prevention.

2.3. Gap Analysis

A systematic review of existing literature on fraud prevention in Nigeria's public sector highlights key research gaps. Firstly, despite the growing emphasis on strengthening internal controls to mitigate fraud risks, there is limited academic research specifically addressing fraud prevention within Nigeria's public sector (Mike, Okpe, & Abu, 2022). Secondly, while studies have explored internal controls, fraud prevention strategies, and forensic accounting separately (Amah, 2023; Ogwiji & Lasisi, 2022; Abdullahi & Mansor, 2018), there is a dearth of research investigating the nature of the role of introducing forensic accounting is playing in this unique Nigerian socio-economic and institutional setting. This gap hinders the development of strategic support for its implementation. Additionally, prior research have primarily focused on governance, ethics, and accountability (Abdulrahman, 2019; Okpala & Enwefa, 2017), leaving an incomplete understanding of how forensic accounting, internal controls, and fraud prevention interact.

Moreover, many studies provided broad recommendations without considering contextual factors affecting fraud policies. The narrow focus on specific public entities (Ifeoluwa Mary, 2017; Okoye & Mbanugo, 2020) further limits the generalizability of findings. To address this, the current study adopts a comprehensive approach, engaging federal ministries and agencies, anti-fraud organizations, and professional accounting bodies. A standardized methodology, supported by the proposed VFAT theoretical framework, aims to enhance academic discourse and provide practical insights for improving fraud prevention in Nigeria's public sector.

2.4. Conceptual Framework

The conceptual framework in **Figure 1**, explores the interplay between key variables, aiming to establish empirical evidence regarding the effectiveness of forensic accounting practice, as a mediator or as moderator in enhancing internal control mechanisms for mitigating fraud risks and prevention within the Nigerian public sector.

3. Methodology

3.1. Research Design

This study adopted a descriptive cross-sectional survey design with data collected in a single point in time (Riitho & Wanjala, 2020). Quantitative research approach was used with data collected using structured 5-point Likert scale questionnaires. This approach is validated by similar quantitative studies, including Gweth (2022) and Vutumu, Aregbeyen, & Akinteye (2024) on the effect of internal control on fraud prevention and detection, Fiergbor (2020); Agbenyo, Jiang, & Cobblah (2018) on financial performance as well as Ashilah, Qintharah, & Fajarwati (2023)

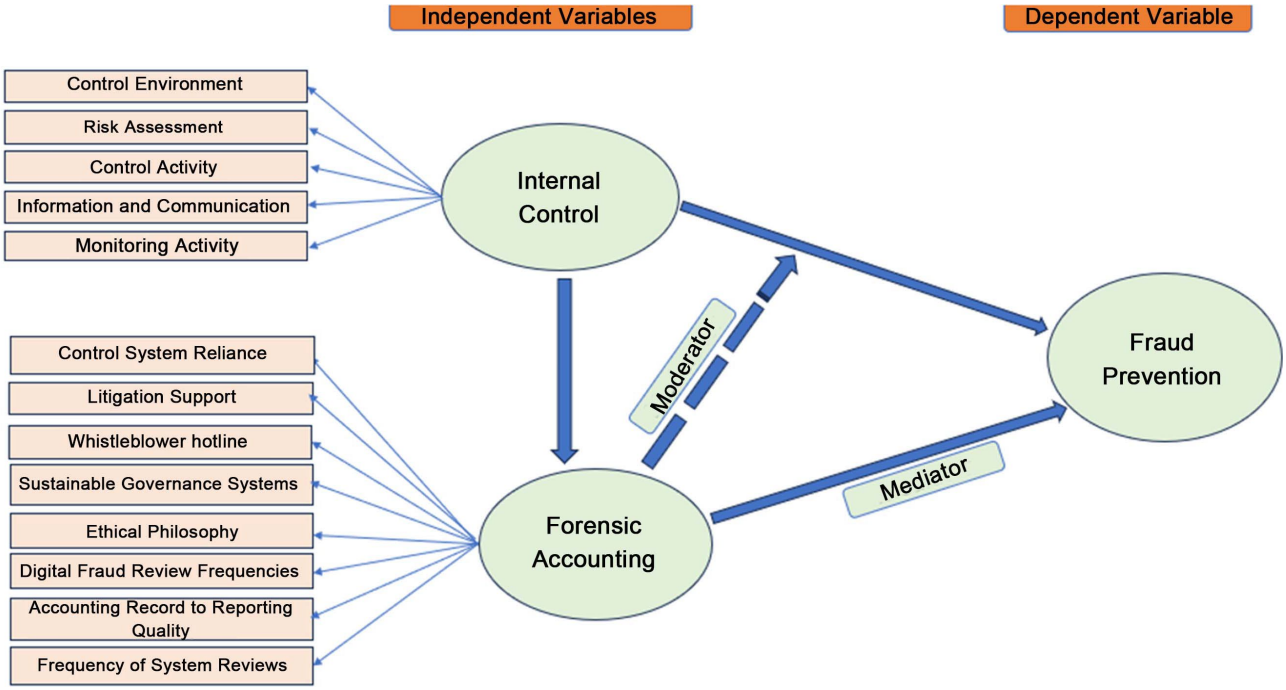

Figure 1. Conceptual framework of forensic accounting moderating or mediating internal control effect on fraud prevention.

on good corporate governance, internal audit, and whistleblowing systems on fraud prevention. The study employed the positivist research philosophy, which assumed that social phenomena can be studied objectively and that empirical methods can be used to generate valid and reliable data (Ryan, 2018).

3.2. Population, Sampling Technique and Data Collection

The target population for this study included public sector organisations in Nigeria which include forty-three (43) federal ministries, forty-two (42) federal agencies including Economic and Financial crimes commission (EFCC), the Independent Corrupt Practices Commission (ICPC), the Code of Conduct Bureau (CCB) and the Police Special Fraud Unit (PSFU). On the professional bench, members of the Institute of Chartered Accountants of Nigeria (ICAN) and the Association of National Accountants of Nigeria (ANAN) as professional accounting bodies, the Chartered Institute of Forensic and Investigative Professionals of Nigeria (CIFIPN), and the Nigerian Judiciary. By incorporating government agencies, ministries, and anti-graft organizations, this study directly captured insights from key entities responsible for governance and oversight in the public sector.

Due to the unavailability of statistics on civil service workers in Nigeria, the study used the Cochran's formula (Cochran, 1977) sample size calculation for an unknown population (Ashwin et al., 2020) to determine the minimum sample size as follows:

$$N = z^2\, pq/d^2$$

where $z^2 = (1.96)^2$, $p = 50\%$ for a population of unknown proportion, $q = 1 - p$,

and $d^2 = (0.05)^2$ for margin of error. The minimum sample size was therefore estimated at 385.

The study employed a combination of purposive and stratified random sampling techniques. The purposive sampling stage targeted individuals with relevant expertise, specifically those holding supervisory or managerial roles in finance, accounting, internal control, audit, or governance, and with at least three to five years of experience in public sector financial management or fraud-risk oversight. Only respondents who met these criteria were then randomly selected for inclusion in the study. Primary data was collected using a structured questionnaire with five-point Likert scale with the following option as: 1) Strongly Agree; 2) Agree; 3) Neutral; 4) Disagree; 5) Strongly Disagree. A pilot study with 25 questionnaires was conducted to assess the reliability and validity of the instrument. Two pilot tests were performed, with internal consistency evaluated using SPSS and the reliability of measurement instruments for each variable using Cronbach's Alpha (Table 1) All variables achieved reliability scores above 0.7, confirming the data's consistency and reliability.

Table 1. Pretest reliability results.

Construct	# of Indicators	# of Cases	Cronbach's Alpha	Remark
Accounting Record (FAAR)	3	25	0.782	Reliable
Digital Fraud (FADF)	3	25	0.75	Reliable
Ethical Philosophy (FAFR)	3	25	0.72	Reliable
Frequency of System (FAFS)	3	25	0.873	Reliable
Litigation Support (FALS)	3	25	0.868	Reliable
Sustainable Governance (FASG)	3	25	0.653	Reliable
Control Environment (CE)	5	25	0.816	Reliable
Risk assessment (RA)	5	25	0.875	Reliable
Control Activities (CA)	5	25	0.702	Reliable
Information and communication (IC)	5	25	0.695	Reliable
Monitoring Activities (MA)	5	25	0.906	Reliable
Fraud Prevention and Fraud (FP)	9	25	0.707	Reliable

3.3. Data Analysis and Model

The data gathered was encoded and inputted into SPSS 26 for thorough refinement. As per Schumacker & Lomax (2010), Structural Equation Modeling (SEM) aligns more closely with real-world scenarios due to its ability to handle multiple variable relationships concurrently. With many constructs and over 50 indicators, traditional regression analysis was unsuitable. Unlike regression, SEM accounts for measurement errors and examines relationships between both observed and latent variables. PLS-SEM is particularly useful in exploratory research where theoretical foundations are not fully established, aligning with the study's primary

objective of theory development.

As shown in Figure 2, this study applied Structural Equation Modeling (SEM) using a two-stage reflective-reflective approach, which involved analyzing latent constructs of forensic accounting, internal control, and fraud prevention in the first stage. In the second stage, the constructs of forensic accounting and internal control were treated as higher-order constructs using a disjointed two-stage model. This method estimates higher-order models in PLS-SEM through two stages: first, linking lower-order constructs (LOCs) to the higher-order construct (HOC) without including the HOC in the path, and second, replacing LOCs with their latent variable scores and introducing the HOC into the model. The validation of this two-stage model includes model specification based on theoretical considerations and careful assessment of the measurement models for both LOCs and the HOC.

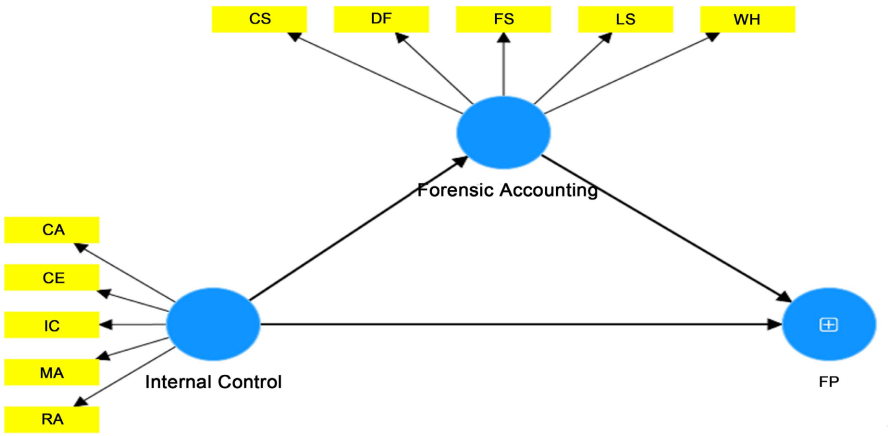

Figure 2. The structural model.

In Figure 3, the model validation process included several steps to ensure robustness and reliability. First, reliability analysis was performed using Cronbach's alpha, rho_a, and composite reliability, with a threshold above 0.70. Next, convergent validity was checked by calculating the Average Variance Extracted (AVE) for each construct, ensuring it exceeded 0.5. Discriminant validity was assessed using the Fornell-Larcker and HTMT criteria (less than 0.85), along with cross-loadings between constructs. These checks were repeated in the second stage due to the reflective-reflective nature of the model.

4. Data Analysis and Interpretation of Results

This study examined the mediating or moderating effect of forensic accounting on the relationship between internal control and fraud prevention in Nigeria Public Sector and was guided by 5 hypotheses:

H1: Internal control has no significant effect on fraud prevention.

H2: Forensic accounting has no significant effect on fraud prevention.

H3: Internal control system has no significant effect on forensic accounting.

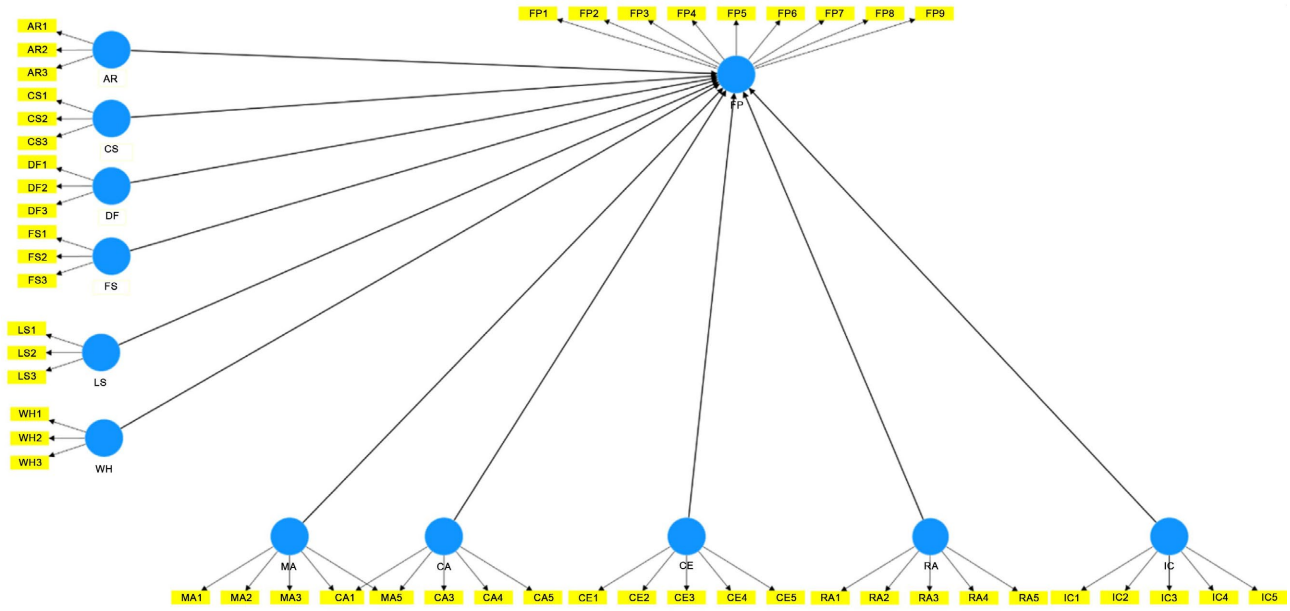

Figure 3. The measurement model.

H4: The effect of internal control on fraud prevention is moderated by forensic accounting.

H5: Forensic accounting does not mediate the internal control effectiveness on fraud prevention.

4.1. Assessment of the Measurement Model

The quality of the constructs in this study was assessed using a measurement model to ensure their reliability and validity (Sarstedt, Ringle, & Hair, 2021). The assessment involved examining indicator reliability, composite reliability, convergent validity (AVE), and discriminant validity (Fornell-Larcker and HTMT criteria). Factor loadings were evaluated, with the minimum acceptable value being 0.50 (Hair et al., 2022) and desirable values above 0.71 (Hair & Alamer, 2022). Initially, eight forensic accounting constructs were analyzed, and after data cleaning, six constructs were retained, dropping Sustainable Governance systems (SG) and Ethical Philosophy (EP) due to low reliability scores and weak measurement validity, indicating that their items did not adequately or consistently capture the intended constructs. Although some factor loadings, specifically, Accounting Record to Reporting Quality (AR), Digital Fraud Review Frequencies (DF), and Frequency of System Reviews (FS) exhibited loadings slightly below the cutoff 0.7 threshold (0.668, 0.693 and 0.651) respectively, their removal was not deemed necessary. For internal control, all five constructs met the 0.7 threshold and for Fraud Prevention (FP). From Table 2, reliability was assessed using Cronbach's alpha, rho_a, and composite reliability, with all constructs exceeding the recommended 0.7 threshold, indicating good reliability (Sarstedt, Ringle, & Hair, 2021). Convergent validity was confirmed through Average Variance Extracted (AVE), showing that all constructs were reliably measured.

Table 2. Reliability and validity analysis of the measurement model.

Construct	Indicators	Loadings	Alpha	Rho_A	CR	AVE
Accounting Record to Reporting Quality (AR)	AR3	0.782	0.908	0.857	0.670	0.782
	AR3	0.922				
	AR3	0.668				
Control System Reliance (CS)	CS1	0.887	0.929	0.953	0.946	0.778
	CS2	0.895				
	CS3	0.898				
Digital Fraud Review Frequencies (DF)	DF1	0.802				
	DF2	0.919				
	DF3	0.693				
Frequency of System Reviews (FS)	FS1	0.817	0.720	0.793	0.828	0.619
	FS2	0.876				
	FS3	0.651				
Litigation Support (LS)	LS1	0.895	0.868	0.869	0.919	0.791
	LS2	0.904				
	LS3	0.868				
Whistle-blower Hotline (WH)	WH1	0.884	0.874	0.874	0.923	0.799
	WH2	0.903				
	WH3	0.895				
Control Environment (CE)	CE1	0.888	0.933	0.958	0.949	0.787
	CE2	0.881				
	CE3	0.868				
	CE4	0.908				
	CE5	0.890				
Risk Assessment (RA)	RA1	0.889	0.935	0.936	0.951	0.795
	RA2	0.885				
	RA3	0.892				
	RA4	0.908				
	RA5	0.882				
Control Activities (CA)	CA1	0.877	0.929	0.953	0.946	0.778
	CA2	0.887				
	CA3	0.857				
	CA4	0.884				
	CA5	0.903				
Information and communication (IC)	IC1	0.888	0.935	0.935	0.951	0.794
	IC2	0.870				

Continued

	IC3	0.864				
	IC4	0.888				
	IC5	0.889				
Monitoring Activities (MA)	MA1	0.887	0.928	0.929	0.945	0.775
	MA2	0.885				
	MA3	0.885				
	MA4	0.885				
	MA5	0.890				
Fraud Prevention (FP)	FP1	0.885	0.969	0.970	0.973	0.801
	FP2	0.898				
	FP3	0.891				
	FP4	0.893				
	FP5	0.895				
	FP6	0.894				
	FP7	0.903				
	FP8	0.888				
	FP9	0.910				

Note: CR = composite validity, AVE = Average variance extracted.

Discriminant Validity Assessment

As mentioned earlier, in this paper, discriminant validity was assessed using Heterotrait-Monotrait Ratio (HTMT) Matrix, Fornell-Larcker criterion and Cross loadings. Fornell and Larcker criterion is the most widely used method for the assessment of discriminant validity involving latent variables for the prevention of multicollinearity issues (Ab Hamid, Sami, & Sidek, 2017). The Fornell and Larcker criteria employed for the study states that for discriminant validity to be achieved, the square roots of AVE must all be greater than the values of their corresponding correlation and this was achieved in this study (Rasoolimanesh, 2022). Average Variance Extracted (AVE) refers to the extent to which items on a specific construct correlate positively and share a high degree of variance (Hair & Alamer, 2022). Heterotrait-Monotrait Ratio (HTMT) of correlations was employed to assess discriminant validity, which determines the extent to which a construct is truly distinct from other constructs in the model. An HTMT threshold of 0.85 or 0.90 is typically applied, with values below this threshold indicating sufficient discriminant validity. In the study, Heterotrait-Monotrait ratio (HTMT) values were all below the acceptable (conservative) threshold of 0.85 (See **Table 3**) except for a few that were slightly above the conservative 0.85 yet, their difference was not significant.

Table 3. Heterotrait-Monotrait ratio (HTMT).

	AR	CA	CE	CS	DF	FP	FS	IC	LS	MA	RA	WH
AR	0.819											
CA	−0.019	0.882										
CE	0.052	0.589	0.887									
CS	0.189	0.220	0.178	0.893								
DF	0.480	0.151	0.207	0.189	0.810							
FP	0.020	0.110	0.190	0.328	0.044	0.895						
FS	0.544	0.121	0.081	0.275	0.536	0.033	0.787					
IC	−0.038	0.619	0.649	0.123	0.097	0.219	0.058	0.880				
LS	0.122	0.163	0.146	0.778	0.099	0.381	0.172	0.098	0.889			
MA	−0.026	0.638	0.567	0.208	0.119	0.141	0.083	0.579	0.185	0.881		
RA	0.022	0.796	0.634	0.164	0.154	0.203	0.083	0.638	0.156	0.578	0.888	
WH	0.206	0.141	0.163	0.763	0.216	0.395	0.257	0.091	0.763	0.170	0.137	0.894

From Table 3, the analysis revealed that the constructs **AR** (Accounting Record to Reporting Quality) and **FP** (Fraud Prevention) demonstrated strong discriminant validity, evidenced by a low HTMT value of 0.02. Similarly, the constructs **FS** (Frequency of System Reviews) and **FP** showed a comparable result, with an HTMT value of 0.033.

However, some constructs indicated potential concerns regarding discriminant validity. For instance, **CS** (Control System Reliance) and **LS** (Litigation Support) exhibited a higher HTMT value of 0.778, nearing the upper threshold but still within acceptable limits. A similar observation was made for **WH** (Whistle-Blower Hotline) and **LS**, which recorded an HTMT value of 0.763. While these values approach the threshold of 0.85, they remain marginally acceptable, thus the constructs may share some overlapping attributes but are still sufficiently distinct for analytical purposes.

Table 4. Fornell-Larcker criterion results.

	AR	CA	CE	CS	DF	FP	FS	IC	LS	MA	RA	WH
AR	0.819											
CA	−0.019	0.882										
CE	0.052	0.589	0.887									
CS	0.189	0.220	0.178	0.893								
DF	0.480	0.151	0.207	0.189	0.81							
FP	0.020	0.110	0.190	0.328	0.044	0.895						
FS	0.544	0.121	0.081	0.275	0.536	0.033	0.787					
IC	−0.038	0.619	0.649	0.123	0.097	0.219	0.058	0.880				
LS	0.122	0.163	0.146	0.778	0.099	0.381	0.172	0.098	0.889			
MA	−0.026	0.638	0.567	0.208	0.119	0.141	0.083	0.579	0.185	0.881		
RA	0.022	0.796	0.634	0.164	0.154	0.203	0.083	0.638	0.156	0.578	0.888	
WH	0.206	0.141	0.163	0.763	0.216	0.395	0.257	0.091	0.763	0.170	0.137	0.894

To further assess discriminant validity, the Fornell-Larcker criterion was applied, as shown in Table 4. This method evaluates the extent to which a construct shares more variance with its own indicators than it does with any other construct, as proposed by Fornell and Larcker (1981). According to this criterion, the square root of the Average Variance Extracted (AVE) for each construct should be greater than its highest correlation with any other construct. The diagonal elements in Table 4 represent the square root of the AVE for each construct. To satisfy the Fornell-Larcker criterion, these diagonal values should exceed the off-diagonal elements in their corresponding rows and columns, which represent correlations between constructs. The analysis confirmed that the square roots of the AVE for all constructs were higher than their corresponding inter-construct correlations. Again, these findings support the conclusion that discriminant validity was established for the model. The results further aligned with the expectation that each construct is distinct and adequately measured by its indicators, reinforcing the robustness of the structural model.

Table 5 shows that all the indicators loaded on to their respective constructs.

Table 5. Cross loading.

	AR	CA	CE	CS	DF	FP	FS	IC	LS	MA	RA	WH
AR1	0.845	−0.059	−0.006	0.155	0.432	0.015	0.491	−0.071	0.070	−0.045	−0.038	0.197
AR2	0.922	0.004	0.078	0.160	0.415	0.021	0.458	−0.009	0.125	−0.009	0.057	0.163
AR3	0.668	0.040	0.072	0.213	0.36	0.004	0.467	−0.011	0.141	−0.001	0.041	0.192
CA1	−0.045	0.877	0.497	0.166	0.096	0.074	0.070	0.537	0.137	0.543	0.669	0.088
CA2	−0.042	0.887	0.520	0.195	0.109	0.100	0.065	0.565	0.155	0.553	0.679	0.118
CA3	−0.056	0.857	0.506	0.22	0.107	0.085	0.074	0.534	0.155	0.562	0.699	0.130
CA4	0.016	0.884	0.526	0.187	0.147	0.089	0.138	0.544	0.149	0.570	0.736	0.140
CA5	0.025	0.903	0.541	0.200	0.184	0.124	0.163	0.549	0.130	0.583	0.721	0.137
CE1	0.004	0.520	0.888	0.135	0.187	0.147	0.074	0.597	0.127	0.491	0.567	0.138
CE2	0.004	0.523	0.881	0.155	0.152	0.151	0.042	0.571	0.145	0.508	0.560	0.139
CE3	0.072	0.522	0.868	0.120	0.216	0.118	0.097	0.567	0.093	0.511	0.576	0.103
CE4	0.099	0.521	0.908	0.198	0.215	0.212	0.111	0.574	0.151	0.516	0.559	0.188
CE5	0.038	0.532	0.890	0.159	0.152	0.185	0.033	0.578	0.121	0.495	0.563	0.131
CS1	0.138	0.231	0.16	0.887	0.138	0.284	0.222	0.119	0.687	0.209	0.163	0.639
CS2	0.224	0.176	0.151	0.895	0.186	0.298	0.281	0.109	0.661	0.194	0.118	0.696
CS3	0.144	0.185	0.166	0.898	0.181	0.298	0.233	0.101	0.736	0.156	0.159	0.709
DF1	0.372	0.146	0.203	0.169	0.802	0.030	0.471	0.089	0.07	0.079	0.178	0.165
DF2	0.418	0.126	0.174	0.154	0.919	0.048	0.461	0.070	0.076	0.122	0.110	0.179
DF3	0.408	0.099	0.126	0.153	0.693	0.020	0.387	0.099	0.118	0.078	0.101	0.210
FP1	−0.048	0.075	0.157	0.294	−0.020	0.885	−0.009	0.182	0.373	0.141	0.183	0.357
FP2	0.029	0.154	0.195	0.301	0.073	0.898	0.046	0.232	0.325	0.161	0.226	0.345

Continued

FP3	0.029	0.091	0.157	0.293	0.017	0.891	0.005	0.203	0.331	0.112	0.179	0.332
FP4	0.064	0.082	0.154	0.279	0.082	0.893	0.060	0.160	0.326	0.086	0.161	0.333
FP5	0.032	0.090	0.173	0.262	0.041	0.895	0.048	0.211	0.342	0.110	0.192	0.332
FP6	−0.005	0.091	0.132	0.314	0.01	0.894	0.023	0.199	0.339	0.113	0.158	0.375
FP7	0.020	0.129	0.214	0.315	0.084	0.903	0.033	0.198	0.358	0.152	0.193	0.375
FP8	0.023	0.050	0.166	0.270	0.008	0.888	0.020	0.145	0.334	0.112	0.145	0.347
FP9	0.018	0.116	0.176	0.311	0.052	0.91	0.036	0.224	0.339	0.138	0.195	0.379
FS1	0.519	0.071	0.084	0.219	0.462	0.026	0.817	0.080	0.102	0.027	0.046	0.197
FS2	0.411	0.104	0.041	0.234	0.420	0.032	0.876	0.025	0.156	0.087	0.061	0.231
FS3	0.371	0.166	0.104	0.214	0.450	0.010	0.651	0.038	0.197	0.118	0.149	0.179
IC1	−0.051	0.563	0.564	0.134	0.078	0.226	0.081	0.888	0.118	0.528	0.553	0.088
IC2	0.012	0.498	0.555	0.089	0.083	0.181	0.029	0.87	0.062	0.459	0.566	0.090
IC3	−0.017	0.516	0.559	0.056	0.102	0.182	0.052	0.864	0.031	0.493	0.557	0.050
IC4	−0.061	0.585	0.568	0.119	0.092	0.181	0.059	0.888	0.091	0.530	0.573	0.071
IC5	−0.044	0.556	0.612	0.134	0.075	0.185	0.028	0.889	0.122	0.536	0.562	0.099
LS1	0.048	0.160	0.154	0.688	0.041	0.342	0.078	0.124	0.895	0.202	0.155	0.650
LS2	0.090	0.154	0.136	0.699	0.106	0.319	0.159	0.068	0.904	0.170	0.150	0.683
LS3	0.184	0.124	0.102	0.687	0.118	0.352	0.219	0.069	0.868	0.124	0.112	0.701
MA1	0.027	0.541	0.511	0.167	0.156	0.130	0.104	0.495	0.138	0.887	0.486	0.161
MA2	0.054	0.573	0.503	0.178	0.139	0.112	0.143	0.497	0.158	0.88	0.535	0.163
MA3	−0.082	0.558	0.474	0.196	0.061	0.128	0.006	0.490	0.158	0.886	0.497	0.122
MA4	−0.046	0.580	0.507	0.156	0.107	0.125	0.063	0.539	0.190	0.861	0.525	0.168
MA5	−0.057	0.560	0.504	0.220	0.065	0.123	0.057	0.530	0.174	0.889	0.504	0.137
RA1	−0.010	0.711	0.554	0.136	0.132	0.185	0.064	0.539	0.137	0.521	0.895	0.101
RA2	0.027	0.704	0.582	0.149	0.150	0.206	0.065	0.569	0.140	0.495	0.897	0.115
RA3	0.060	0.694	0.541	0.157	0.187	0.170	0.103	0.557	0.153	0.507	0.888	0.165
RA4	0.039	0.724	0.593	0.163	0.126	0.192	0.084	0.609	0.148	0.516	0.910	0.131
RA5	−0.028	0.707	0.543	0.116	0.078	0.137	0.048	0.563	0.109	0.539	0.849	0.095
WH1	0.131	0.082	0.144	0.666	0.194	0.359	0.210	0.078	0.671	0.117	0.092	0.884
WH2	0.245	0.168	0.165	0.689	0.232	0.353	0.267	0.106	0.675	0.173	0.173	0.903
WH3	0.179	0.129	0.126	0.693	0.152	0.346	0.211	0.060	0.700	0.167	0.103	0.895

4.2. The Structural Model Assessment

After establishing the validity and reliability of the indicators and the constructs, the Structural Model Assessment focused on the interplay between Forensic Accounting, Internal Control, and Fraud Prevention. The assessment begins with an evaluation of the Variance Inflation Factor (VIF) for each predictor to ensure the absence of multicollinearity; followed by an examination of the structural rela-

tionships, including the strength, direction, and statistical significance of these connections. Each relationship was scrutinized to determine how these constructs interact and influence each other, and the coefficients and statistical tests were used to gauge the magnitude and reliability of these effects. Additionally, besides its relevance in real-world contexts, this model advances academic discussions by providing empirical evidence that links Vutumu Forensic Accounting Theory (VFAT), the COSO framework for internal control, and the Pentagon Model of fraud prevention.

Table 6. Multicollinearity results.

Construct	VIF
Forensic Accounting → FP	1.033
Internal Control → FP	1.033
Internal Control → Forensic Accounting	1
Forensic Accounting × Internal Control → FP	1

The Variance Inflation Factor (VIF) was assessed for each predictor to check for multicollinearity. As shown on **Table 6**, the VIF values for Forensic Accounting, Internal Control, and their interaction were all close to 1 (1.033, 1.033, and 1 respectively), indicating no multicollinearity among the predictors. This revealed that each predictor contributes unique information to the model, enhancing its predictive power and interpretability.

Table 7. Combined effects of predictors on fraud prevention.

	R-square	R-square adjusted
Fraud Prevention (FP)	0.214	0.208
Forensic Accounting (FA)	0.032	0.029

R square (R2) was employed to evaluate the overall impact of proposed independent variables on the dependent variable. The results, as shown in **Table 7** reveal that the combined effect of forensic accounting and internal control contributes 21.4% variation on fraud prevention, of which forensic accounting contributes 3.2%. Other factors not captured in the study contributed for the rest. The adjusted R-square value considers the number of predictors in the model is 0.208 for FP et 0.029 pour FA, slightly lower than the R-square values. This is expected as the adjusted R-square will always be less than or equal to the R-square. It still falls within the "substantial" range according to Cohen's guidelines, indicating a good level of prediction (Cohen, 1988).

4.3. Hypothesis Testing

Before testing for mediation and moderation, we first examined whether internal

control significantly affects fraud prevention, whether forensic accounting significantly influences fraud prevention, and whether internal control has a significant impact on forensic accounting. The tests help determine the direct relationships between the variables, ensuring a solid foundation for analyzing the mediating or moderating role of forensic accounting.

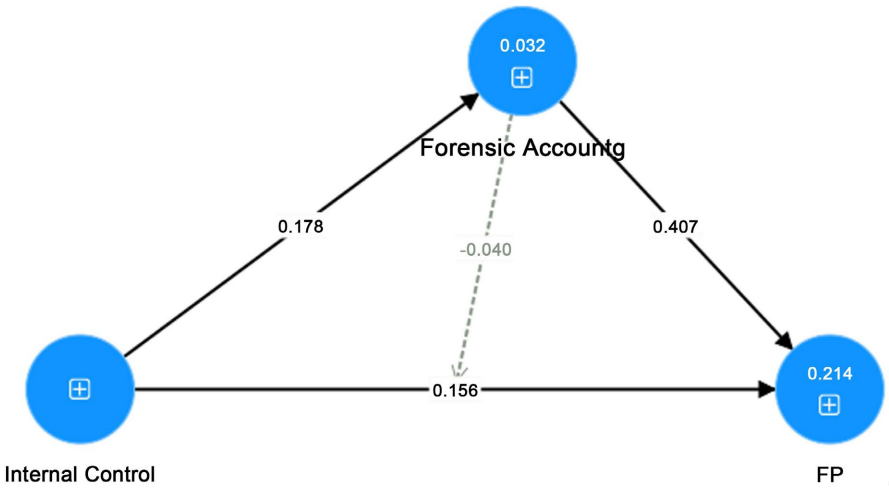

Figure 4. Path model with r-squared.

Table 8. Hypotheses verification.

Direct effect or Paths	Coef.	t statistics	P values	Remark
Forensic Accounting → FP	0.407	8.862	0.001	significant
Internal Control → FP	0.156	3.373	0.001	significant
Internal Control → Forensic Accounting	0.178	3.016	0.003	significant

The study's findings in Figure 4 and Table 8 uncovered that forensic accounting have a significant and positive effect on fraud prevention (**$\beta = 0.407$, $t = 8.862$, $p < 0.001$**). This finding suggests that organizations implementing forensic accounting practices from the Vutumu Forensic Accounting Theory (VFAT), such as accounting record quality, control system reliance, digital fraud review frequency, system review frequency, litigation support, and whistle-blower hotlines, are more likely to achieve improved fraud prevention outcomes.

Similarly, there is a significant positive direct effect of internal control on fraud prevention ($\beta = 0.156$, $t = 3.373$, $p < 0.001$), strongly supporting that internal control has a positive and significant effect on fraud prevention in the Nigeria public sector. In other words, a unit increase in internal control could lead to a 0.0156 increase in fraud prevention in the public sector with other factors held constant.

This study further examined the effect of internal control systems on forensic accounting and found that there is a positive and significant direct effect ($\beta = 0.178$, $t = 3.016$, $p = 0.003$) with 95% confidence. The finding suggests that a strong internal control environment directly strengthens forensic accounting efforts.

4.3.1. Moderation Analysis

This study posited that the effect of internal control on fraud prevention is moderated by forensic accounting. As shown in Table 9 and Figure 4, the coefficient for the interaction term was found to be −0.04, suggesting a negative relationship. However, this effect was not statistically significant, t = 0.96, $p = 0.337$. This suggested that the current study lacked sufficient evidence to support the hypothesis that Forensic Accounting moderates the relationship between Internal Control and Fraud Prevention. This indicated that while there is a tendency for the positive impact of Internal Control on Fraud Prevention to decrease as Forensic Accounting increases, this effect is not strong enough to be considered statistically significant at the 5% level. Therefore, we cannot conclusively state that Forensic Accounting significantly moderates the relationship between Internal Control and Fraud Prevention. The nature of the relationship was established in Figure 5.

Table 9. The moderating effect of Forensic accounting on Internal Control and Fraud Prevention.

Moderation effect	Coef.	t-statics	*p*-Values	Remark
Forensic Accounting × Internal Control → FP	−0.04	0.96	0.337	insignificant

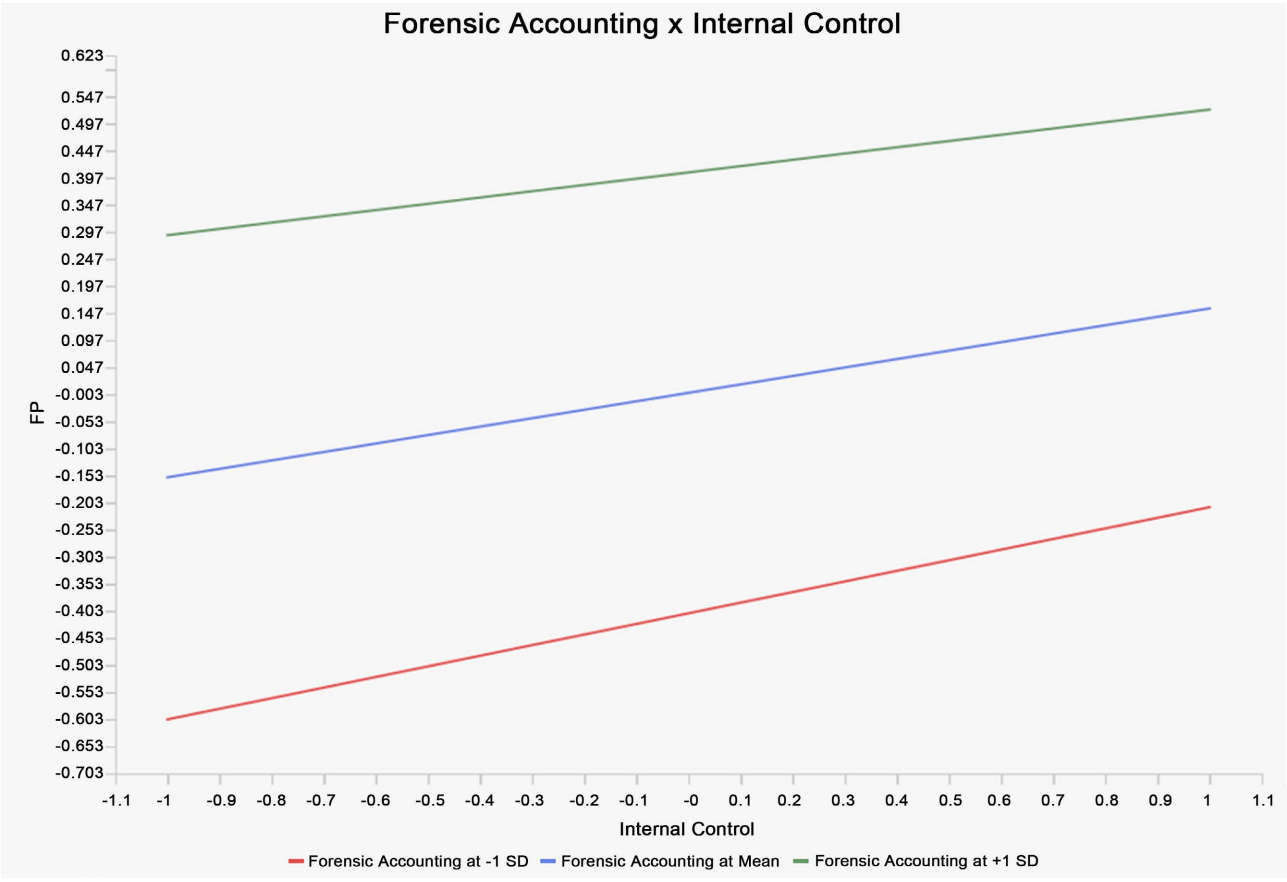

Figure 5. Forensic accounting and internal control on the fraud prevention.

Figure 5 illustrated the interaction effect of Forensic Accounting and Internal Control on the dependent variable, Fraud Prevention. In all three scenarios, an increase in Internal Control is associated with an increase in the fraud prevention, as indicated by the positive slopes of the trend lines. This study revealed that Internal Control has a positive effect on fraud prevention, regardless of the level of Forensic Accounting.

4.3.2. Mediation Effect

Table 10. The mediation effect of forensic accounting on the relationship between internal control and fraud prevention.

Indirect effect					
Mediator (internal control)	**Coef**	**T statistics**	***p* values**	**2.5%**	**97.5%**
Internal Conrol → Fraud Prevention	0.072	2.991	0.03	0.027	0.122

Following the theoretical model, this study hypothesized that the effect of internal control on fraud prevention is not mediated by forensic accounting. In Table 10, the mediation analysis conducted using the bootstrapping technique with 5000 samples showed 0.072 (t = 2.991, $p = 0.03$, 95% CI [0.027, 0.122]). This indicated that the indirect effect of internal control on fraud prevention through forensic accounting, as the mediator is positive and statistically significant, therefore refuting the null hypotheses. The 95% confidence interval (CI) for the indirect effect does not include zero (0.027 to 0.122), further confirming the significance of the mediation effect. The direct effect of internal control on fraud prevention was also significant. According to (Hair et al., 2022) when the indirect effect and the direct effects are significant and point in the same direction, the mediation is said to be complementary mediation. Therefore, this study found that the effect of internal control (COSO dimensions) on fraud prevention in public institutions in Nigeria is partially mediated by forensic accounting (VFAT dimensions).

Thus, the study found strong evidence to conclude that the use of internal control indirectly enhances fraud prevention through the enhancement of forensic accounting VFAT model. In this case, an increase in the use of internal control practices supplemented by forensic accounting practices leads to a corresponding increase in the prevention of fraudulent activities within the organizations.

5. Discussions

This study explored the significant role that forensic accounting plays on the relationship between internal control systems and fraud prevention in the Nigerian public sector. A particularly insightful finding from this study is the indirect or mediating effect of forensic accounting on internal control and fraud prevention. Forensic accounting, when effectively integrated with internal control practices, plays a pivotal role in strengthening the overall fraud prevention framework. Specifically, the use of Vutumu Forensic Accounting Theory (VFAT) variables which

include control system reliance, detailed accounting to reporting checks and whistleblower hotlines, can significantly improve the effectiveness of internal controls, thus contributing to the prevention of fraudulent activities.

This study emphasizes the complementarity of forensic accounting and internal control systems, with forensic accounting playing a partially mediating role in the relationship between internal control and fraud prevention. This mediation effect suggested that forensic accounting does not operate in isolation but rather amplifies the effects of well-structured internal controls, particularly in environments with high fraud risk, such as the public sector. According to Sarstedt et al. (2021) the use of PLS-SEM in mediation models provides more reliable results than traditional regression-based methods. The use of PLS-SEM in this study further strengthens the claim that forensic accounting, when combined with strong internal control systems, leads to a more effective deterrent against fraud. For instance, Alzoubi (2023) examined the impact of corporate governance and forensic accounting on enhancing internal control effectiveness in fraud prevention, finding a significant positive relationship between these factors. Similarly, Oladipo & Olurotimi (2021) highlighted the strong positive influence of forensic accounting on fraud prevention in Nigerian MDAs ((Ministries, Departments and Agencies), reinforcing its complementary role in internal control systems.

In terms of the direct effect of forensic accounting on fraud prevention, this study found a positive and statistically significant relationship. Specifically, an increase in the use of forensic accounting techniques was associated with an increase in fraud prevention outcomes. The results suggested that organizations that adopted Vutumu Forensic Accounting Theory variables, such as Accounting Record to Reporting Quality (AR), Control System Reliance (CS), Digital Fraud Review Frequencies (DF), Frequency of System Reviews (FS), Litigation Support (LS), and Whistle-blower Hotlines (WH), were more likely to experience a reduction in fraud incidents. These findings are aligned with the broader literature on the role of forensic accounting in fraud detection and prevention. For example, Ogunode & Dada (2022) found a substantial correlation between fraud prevention and forensic accounting; Eneisik & Ogbonna (2021), Olaniyan et al. (2021) studies revealed that forensic accounting is a strategic and dynamic tool for fraud detection in federal government parastatals in Nigeria. Similarly, Fiergbor (2020) also identified a significant positive relationship between forensic accounting practices and fraud prevention in Ghana, concluding that these practices are crucial for identifying red flags and mitigating fraud risks in organizations. Similarly, Ogiriki & Appah (2018) and Afriyie et al. (2022) demonstrated that forensic accounting skills, including investigative techniques and audit procedures, significantly improve the effectiveness of fraud detection and prevention efforts.

The confirmed mediating relationship demonstrates that internal controls effectiveness is significantly enhanced when forensic accounting techniques are applied within the control environment. In practice, this implies that strong internal controls create structured, well-documented, and transparent processes with reli-

able audit trails, enabling forensic tools, such as digital fraud reviews, forensic data interrogation, record-to-report assessments, and whistleblower mechanism, to detect anomalies, trace irregularities, and investigate suspicious transactions more accurately. Forensic accounting therefore translates internal control strengths into practical fraud prevention outcomes. This demonstrates that forensic accounting is not merely supportive but a critical mechanism through which internal controls achieve both preventive and detective effectiveness in the Nigerian public sector.

Limitations of the Study

Although this study provides valuable insights, it is subject to several limitations that should be considered when interpreting the findings. First, the cross-sectional research design restricts the ability to draw strong causal inferences between internal control systems, forensic accounting practices, and fraud prevention outcomes when compared to a longitudinal design, which would provide deeper insight into how these relationships evolve over time. Second, the use of self-reported survey data may introduce social desirability bias, as respondent, particularly those in finance, audit, and control roles, might overstate the strength of their internal controls or the effectiveness of forensic practices. Third, the study focused solely on the Nigerian public sector, which may limit the generalizability of findings to other contexts with different governance structures, regulatory environments, or fraud risk profiles. Finally, while PLS-SEM is appropriate for predictive modeling, its results depend on the quality of the measured constructs, meaning any measurement limitations could influence interpretation.

6. Conclusion

This study was conducted to examine the moderating and mediating role of forensic accounting on the relationship between internal control systems and fraud prevention in the Nigeria public sector. From the findings, the study concluded that there is strong evidence supporting a positive and significant effect of internal control on fraud prevention, forensic accounting on fraud prevention and that forensic accounting mediates the internal control effectiveness on fraud prevention in the Nigerian Public sector. The findings provide solid evidence that the adoption of forensic accounting practices through the implementation of the VFAT model, along with effective internal control systems, is crucial for preventing fraud in public sector organizations. The study, however, failed to establish that forensic accounting moderates the relationship between internal control and fraud prevention.

Theoretically, the study reinforces the importance of integrating forensic accounting into established internal control frameworks such as COSO, to effectively combat fraud. This integration expands the Vutumu Forensic Accounting Theory (VFAT) by positioning forensic accounting as a crucial fraud-deterrence mechanism that complements the reliability and effectiveness of internal controls.

6.1. Practical Implications

The findings highlight several actionable steps for policymakers and practitioners:

a) ***Institutionalize Forensic Accounting Practices***: Public sector organizations should formally incorporate forensic accounting units and processes, including fraud data analytics, whistleblower systems, and digital fraud reviews into their internal control structures.

b) ***Adopt a Dual Preventive-Detective Strategy***: Fraud prevention should be seen as an ongoing process combining strong preventive controls (internal control systems) with detective tools (forensic accounting techniques). Therefore, forensic accounting should be viewed as a complementary tool rather than a standalone solution, working in tandem with internal controls to strengthen fraud prevention frameworks.

c) ***Strengthen Internal Control Systems Using the VFAT***: Particular attention should be given to VFAT's control system reliance component that underscores the importance of robust COSO internal control systems. It ensures that COSO-based controls are not only present but regularly tested for reliability, resilience, and forensic responsiveness.

d) ***Invest in Training and Capacity Building***: Specialized training programs should be developed for finance, audit, and control personnel to enhance their forensic accounting competencies and support continuous fraud vigilance.

e) ***Develop Supportive Policies and Governance Structures***: Policymakers should craft regulations that promote ethical conduct, protect whistleblowers, and mandate periodic forensic reviews of financial and digital systems.

6.2. Recommendations for Further Research

This research calls for further studies on how forensic accounting practices can be optimized within different organizational settings, particularly in public sector institutions where fraud risks are often elevated, and assess the contextual factors that enhance or hinder their effectiveness. Further research is also recommended to refine the Vutumu Forensic Accounting Theory (VFAT) model and examine its applicability across different jurisdictions, governance environments, and organizational contexts in both the public and private sectors.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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